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(54) Safety belt system with backrest locking mechanism

(57) A safety belt system for a vehicle seat having a folding backrest 50 securable to the vehicle bodywork comprises a safety belt reeling means 51 arranged to be mounted on the seat itself, and a locking mechanism for securing the backrest, mounted on the reeling means 51. The locking mechanism comprises a claw disc 55 which cooperates with an anchor member 54 secured to the vehicle and is pivotally mounted on the housing 52 of the belt reeling means 51. The claw disc 55 is spring-biased into its locking position and is arranged and mounted in such a way that, when it is released, a self-opening moment is produced on the claw disc 55, and such that the movement of opening of the claw disc 55 is effected by means of an actuating device 66 which is designed to ensure movement in the same direction as the movement of the backrest 50 and the movement of the claw disc 55.

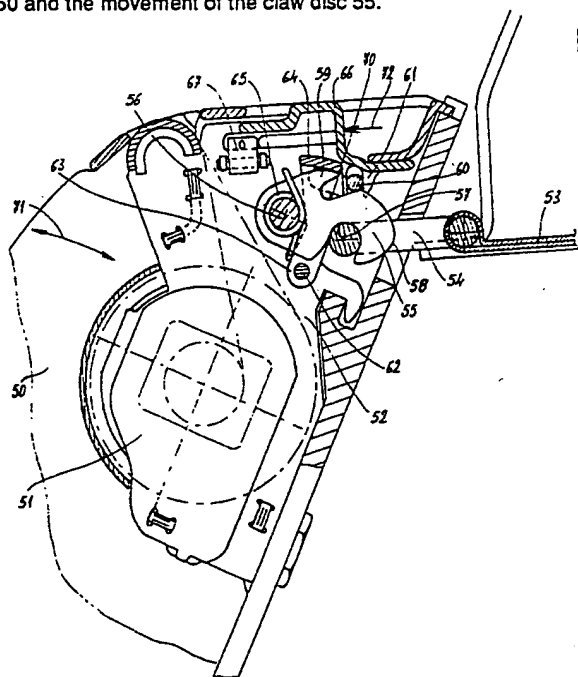


FIG.1

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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FIG. 1

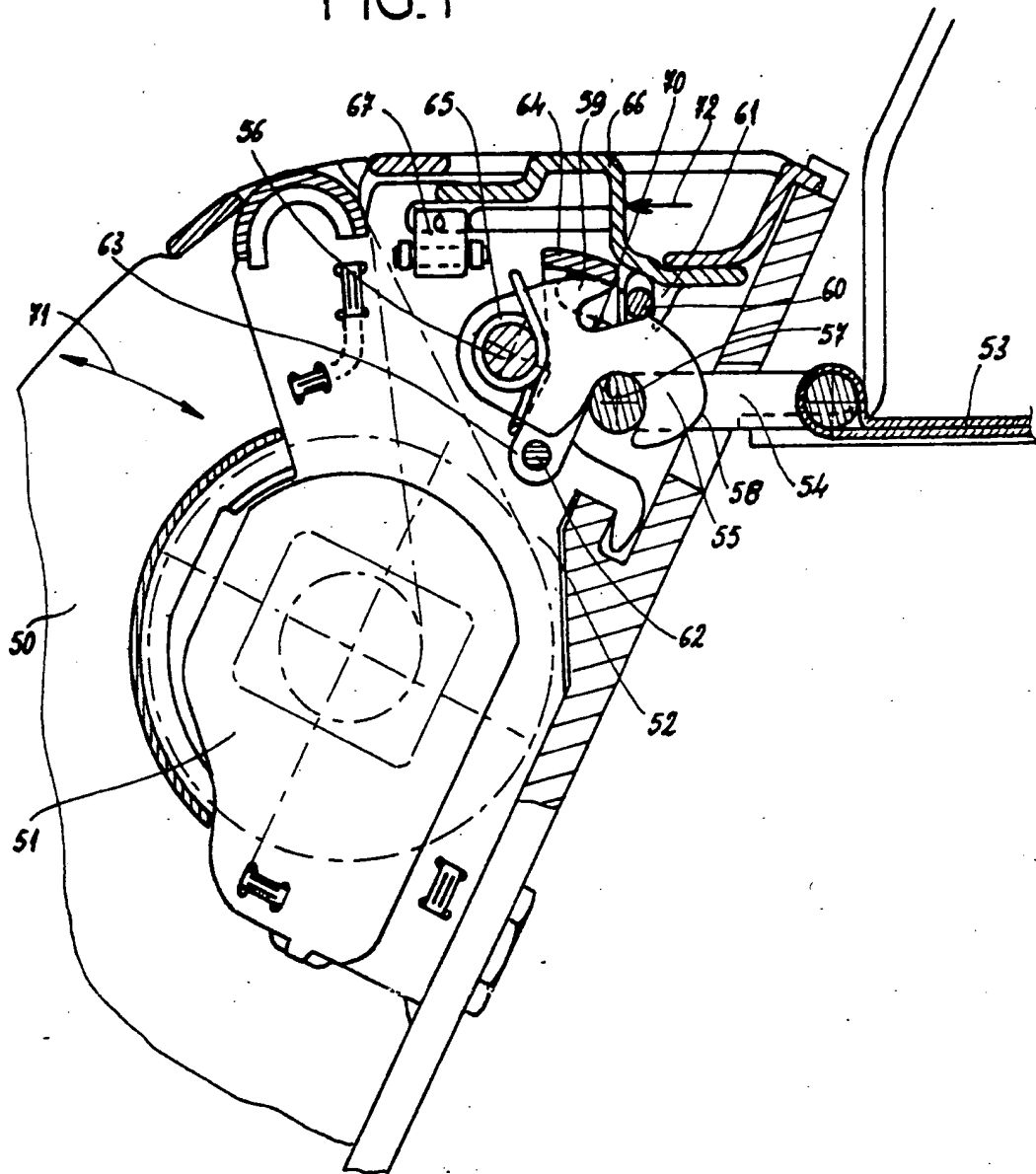
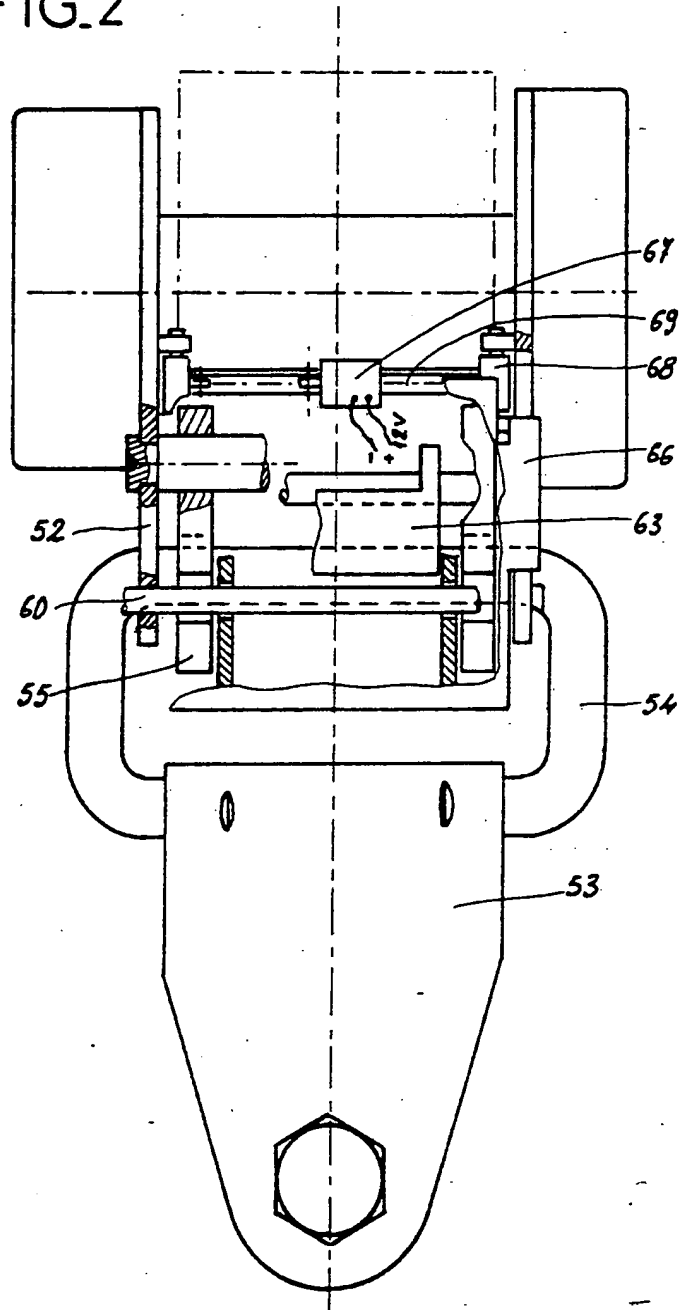


FIG.2



Safety belt system with backrest locking mechanism

The invention relates to a safety belt system for a vehicle seat having a folding backrest securable to the vehicle bodywork, the system comprising safety belt reeling means adapted to be mounted on the seat itself.

5 A safety belt system of this kind is described in DE-AS 22 53 307, in which the object is to deflect any forces which occur in the event of stressing of the safety belt system, for example in the event of an accident, into the vehicle bodywork. In
10 the known system, a self-locking belt reeling means is provided in the backrest, the belt strap of which is secured to the roof of the vehicle, so that the forces occurring are transmitted in this way.

15 The problem of deflecting the forces which proceed from the safety belt, particularly in the case of an accident, into the vehicle bodywork arises more particularly in connection with the bench-style rear seats and individual rear seats
20 in which the backrest can be pivoted between an upright sitting position and a folded, horizontal loading position and can be locked in these two positions. If the safety belt system is then anchored essentially in the pivotal backrest of the vehicle
25 seat, there is a risk that the locking of the backrest will give way under the effect of the forces or that the transfer of forces in the backrest itself will constitute a weak point between the belt reeling means and the locking mechanism.

30 According to the invention there is provided a safety belt system for a vehicle seat having

a folding backrest securable to the vehicle bodywork, the system comprising safety belt reeling means adapted to be mounted on the seat itself, and a locking mechanism for securing the backrest, the
5 mechanism comprising a claw member pivotally mounted on a housing of the belt reeling means and arranged to cooperate with an anchor member secured to the vehicle bodywork, the claw member being spring
10 biased into its locking position and arranged such that, when it is released, a self-opening moment is produced on the claw member, the opening movement of the claw member being effected by means of an
15 actuating device which is arranged for movement in the same direction as the movement of the backrest and the movement of the claw member.

At least in its preferred forms, the invention has the advantage that, thanks to the integration of the belt reeling housing and the backrest locking means, there is a direct rectilinear transmission
20 of forces in the event of a load, since the safety belt system will only be subjected to load when the backrest is secured. Furthermore, the preferred apparatus takes up particularly little room, which is of crucial importance in the restrictive space
25 of a vehicle, particularly in smaller vehicles, and moreover the apparatus has only a few interacting components and the entire apparatus is lightweight.

Thus, the safety belt forces can be safely deflected into the vehicle bodywork, along a straight
30 force flow path, the components required being easy to construct and easy to manipulate in their interaction.

The invention provides in particular that after the actuating device which may be in the
35 form of a sliding key has been actuated to release the claw member, there will be a self-opening moment acting in the rotary direction of opening of the

claw member. The opening movement is further aided by the fact that the movement of the actuating device and the rotational opening movement of the claw member effected thereby are arranged in the same direction as the movement of the backrest.

Preferably the claw member is secured in its locking position, to prevent a movement of opening, by means of a securing pin movably guided in the housing, the securing pin being engagable in a slot of the claw member so that when the actuating device or sliding key is moved to release the claw member, the securing pin moves into the slot of the claw member simultaneously to aid the rotation thereof.

In order to ensure that, in the released position of the claw member, the securing pin cannot assume a position which prevents the claw member from reopening, a safety catch is preferably provided which, when the backrest locking mechanism is released, holds the securing pin away from the securing position of the claw member, so that when the backrest is returned to the upright position the anchor member can engage the claw member to pivot it upwards counter to the spring force biasing it into the locking position.

The safety catch may be arranged to extend, with its pivoting movement, into the path of travel of the anchor member during the locking operation, so that the safety catch is pivoted when the anchor member is inserted into the backrest locking mechanism and in this way releases the securing pin for securing the claw member in its locking engagement with the anchor member which will then automatically occur.

According to one embodiment of the invention, when the vehicle is in motion and the backrest must be securely anchored to the vehicle at all

times in order to prevent accidental release, locking means is inserted in the path of movement of the actuating device, this locking means being controlled, for example, by a magnetic force maintained during the operation of the vehicle.

At least in its preferred forms the invention thus has the advantage that on the one hand the releasing forces are substantially reduced by the self-opening moment and on the other hand the locking is made shockproof and secured against accidental unlocking or any unlocking which is not permissible when the vehicle is in motion.

Certain preferred embodiments of the invention will now be described by way of example and with reference to the accompanying drawings, in which:

Fig. 1 is a side view of a belt reeling means with a backrest locking mechanism in the locked position;

Fig. 2 shows the apparatus of Figure 1 from above; and

Fig. 3 shows another embodiment of a belt reeling means with a backrest locking mechanism in side view.

The drawing in Figure 1 shows a backrest 50 with belt reeling means 51 secured thereto, which is arranged on its housing 52 in order to receive the backrest locking mechanism.

Fig. 1 shows the upright position of the backrest 50 in which the belt reeling means 51 is locked in position by means of an anchor member comprising a wire strap 54 anchored to the bodywork 53. The backrest 50 can be pivoted out of this position in the direction of the arrow 71, and for this pivoting movement of the backrest the locking mechanism has to be released.

For this purpose, a claw member comprising a claw disc 55 is mounted on the belt reeling means

housing 52 so as to be pivotable about a bearing pin 56 and has a recess 57 for engaging over the wire strap 54 to secure it in position. At its front end, facing the wire strap 54, the claw disc 55 is rounded off so as to form an insertion slope 58. The recess 57 in the claw disc 55 is positioned in the front area so that, in the event of release, because of the tensile force involved in the direction 71 of pivoting of the backrest 50 a self-opening moment is produced.

Arranged to slide over the top edge of the claw disc 55, there is a securing pin 60 movably mounted in a bent sliding guide 59 of the housing 52, this securing pin being connected, with play, to a sliding key 66, via a fork-shaped cam 61, as the actuating means for the backrest locking device so that it follows the path of the sliding guide 59 when the sliding key 66 is moved between a locking position and a release position. The securing pin also penetrates into a slot guide 70 formed on the claw disc 55, the configuration of which in the claw disc 55 is such that the slot 70 intersects the path of the sliding guide 59.

Beneath the claw disc 55, a safety catch 63 is rotatably mounted about a bearing pin 62, whilst the catch surface 64 arranged above the claw disc 55 is formed in the manner of a sector of a circle and its path of movement intersects the sliding guide 59. The web-like connection between the catch surface 64 and the bearing pin 62 of the safety catch 63 extends, in its set pivoting movement, into the path of movement of the wire strap 54 secured to the vehicle, which the wire strap 54 describes during the locking operation and the consequent penetration into the belt reeling means. The safety catch 63 is biased by means of a torsion spring 65 into the rotary direction

of locking of the claw disc 55 whilst with its other leg the torsion spring 65 presses the sliding key 66 into its starting position.

The movement of the sliding key 66 can be
5 blocked by means of locking means 68 which is capable of rotating into its path of movement under the effect of a magnet 67, these locking means being movable by the magnet 67 via intermediate push rods 69.

10 Finally, with regard to the arrangement of the components as described, Figure 2 shows that, in the embodiment described hereinbefore, for reasons of symmetry and the resulting uniform transmission of force, claw discs 55 are arranged on both sides
15 of the housing 52, and, being symmetrical in their arrangement and movement, will engage securely around the wire strap 54 in the event of locking.

The back rest locking mechanism for the safety belt described operates as follows:

20 In the locked position shown in Figure 1, the claw discs 55 engage with their recesses 57 around the wire strap 54 and in this position they are secured by the securing pin 60 which is in its foremost position in the housing slide 59,
25 so that the claw discs 55 are prevented from opening even in the event of a load suddenly being imposed.

Starting from this locked position, displacement of the sliding key 66 in the direction of the actuating arrow 72 will cause the securing pin 60 to be picked
30 up by means of the cam fork 61, whilst the securing pin 60 in the sliding guide 59 is pushed out of its securing position into the bent area of the sliding guide 59. At the same time the securing pin 60 also moves into the slot 70 in the claw
35 disc and comes to rest at the end of the slot 70 and presses against the claw disc 55 to cause it to make a rotational opening movement. This rotational

opening movement of the claw disc 55 is crucially aided by torque, which has a self-opening effect, this torque being established as a result of the propelling force acting on the sliding key 66 and hence on the backrest 50 during the movement of release. This pivoting movement of the claw discs 55 is continued until the wire strap 54 moves free of the claw discs 55.

In this position, the securing pin 60 is pushed along in the sliding guide 59 until the safety catch 63 with its catch surface 64 intersecting the sliding guide 59 is able to pivot towards the wire strap 54 and thus fix the securing pin 60 in the released position in the sliding guide 59, so that after the sliding key 66 has been released the securing pin 60 is no longer able to return to its front locking position and thereby prevent the pivoting of the claw disc 55 for another opening operation. The claw discs 55 themselves return to their starting position.

If the backrest 50 is to be folded into the upright position and locked to the bodywork 53, when the backrest is folded back the wire strap 54 initially enters the belt reeling means 51, raising the claw discs 55 over the insertion slope 58. The wire strap 54 makes contact with the side web of the safety catch 63 and pushes it back counter to the force of the torsion spring 65. As a result, the catch surface 64 releases the sliding guide 59 for a securing movement of the securing pin 60 so that this pin 60 is able to slide forwards in the guide 59 and press the claw discs 55 into the locked position and secure them by sliding over them. The securing pin 60 is acted upon by the torsion spring 65, by virtue of being coupled to the key 66 and hence also effects the loading of the claw discs 55 in their locking position.

Thanks to the torsion spring 65 which braces the components relative to one another, rattling noises inside the apparatus are advantageously avoided.

5 Since unlocking of the backrest 50 while the vehicle is in motion has to be prevented, as a further safety measure, locking means 68 are provided which block the path of the sliding key 66, since unless the sliding key 66 is actuated
10 the securing pin 60 coupled thereto is forced to stay motionless in the position which secures the claw disc 55. These locking means 68 are introduced into the path of travel of the sliding key 66 by means of push rods 69, in the embodiment shown
15 by way of example, by means of magnet 67 which is activated electrically or mechanically while the vehicle is in operation, so that the locking means 68 are securely held in position.

Finally, as shown by way of example in Figure
20 3, for the sake of completeness, it is also possible to construct the actuating device as a rotary knob 66, the components being otherwise of identical arrangement and moving relative to one another in exactly the same way. No major differences
25 arise with respect to the association of the components and their operation.

It is to be clearly understood that there are no particular features of the foregoing specification, or of any claims appended hereto, which are
30 at present regarded as being essential to the performance of the present invention, and that any one or more of such features or combinations thereof may therefore be included in, added to, omitted from or deleted from any of such claims if and
35 when amended during the prosecution of this application or in the filing or prosecution of any divisional application based thereon. Furthermore the manner

in which any of such features of the specification or claims are described or defined may be amended, broadened or otherwise modified in any manner which falls within the knowledge of a person skilled
5 in the relevant art, for example so as to encompass, either implicitly, equivalents or generalisations thereof.

CLAIMS

1. A safety belt system for a vehicle seat having a folding backrest securable to the vehicle bodywork,
5 the system comprising safety belt reeling means adapted to be mounted on the seat itself, and a locking mechanism for securing the backrest, the mechanism comprising a claw member pivotally mounted on a housing of the belt reeling means and arranged
10 to cooperate with an anchor member secured to the vehicle bodywork, the claw member being spring biased into its locking position and arranged such that, when it is released, a self-opening moment is produced on the claw member, the opening movement
15 of the claw member being effected by means of an actuating device which is arranged for movement in the same direction as the movement of the backrest and the movement of the claw member.
2. A safety belt system as claimed in claim 1,
20 wherein a securing pin coupled to the actuating device is provided for fixing the claw member in its locking position secured to the anchor member.
3. A safety belt system as claimed in claim 2,
25 wherein the securing pin is guided in a sliding guide formed in the housing and a safety catch pivotally mounted on the housing is provided for holding the securing pin in position when the claw member is released.
4. A safety belt system as claimed in claim
30 3, wherein the sliding guide has a bent configuration and intersects the path of movement of the safety catch.
5. A safety belt system as claimed in claim
3 or 4, wherein the safety catch is engagable with
35 the anchor member secured to the vehicle.
6. A safety belt system as claimed in any of claims 3 to 5, wherein between the actuating device

and the safety catch, a torsion spring is provided for generating a spring bias acting on the claw member and the actuating device.

7. A safety belt system claimed in any of claims 2 to 6, wherein the securing pin is coupled to the actuating device by means of a fork-shaped cam mounted thereon and providing some clearance with the securing pin.

8. A safety belt system as claimed in any of claims 2 to 7, wherein the claw member has a slot for receiving the securing pin, and wherein the orientation of the sliding guide and the claw member slot differ from each other so that, when the securing pin is moved in the sliding guide, torque is exerted on the claw member.

9. A safety belt system as claimed in any preceding claim, wherein the actuating device is securable by means of separately operated locking means to prevent it being used when the vehicle is in motion.

10. A safety belt system as claimed in claim 9, wherein the locking means is movable, by means of push rods actuated by a magnet, into the path of travel of the actuating device.

11. A safety belt system as claimed in claim 9 or 10, wherein the locking means is capable of being set, mechanically or electrically, to the driving state of the vehicle in order to effect locking thereof.

12. A safety belt system as claimed in any preceding claim, wherein the actuating device is constructed as a sliding key with a linear path of travel.

13. A safety belt system as claimed in any of claims 1 to 11, wherein the actuating device is constructed as a pivoting key which follows a curved path.

14. A safety belt system substantially as hereinbefore described with reference to Figures 1 and 2 or Figure 3 of the accompanying drawings.